



Invasive Species and Control

Management of Aquatic Weeds

- In 1980, Governor Riley created the SC Aquatic Plant Management Council for the purpose of providing statewide coordination of aquatic plant management.
- In 1990, Governor Campbell established SC Aquatic Plant Management Program directed by the Council, which later was administered by the SC DNR.
- Management of noxious, invasive aquatic species is required for all public waterways, including Lake Greenwood.

- Not all exotic species cause problems, but those that disrupt natural ecosystem functions, impair use of areas, and adversely effect native populations need to be curtailed.
- Lake Greenwood has problems with hydrilla and najas, primarily.
- SC DNR found that from 1981 to 2006, \$22.6 million was spent for hydrilla and other priority invasives in the public waterways.

- Some impacts from invasive exotics include:
 - Limited recreational uses
 - Public perception
 - Blocked water flow
 - Reduced property values
 - Degraded water quality
 - Reduce biodiversity
 - Increased habitats for mosquitoes
 - Economic costs
 - Ecological impacts
 - AVM

Hydrilla and Najas

- In South Carolina, hydrilla was first found in Lake Marion in 1982. Now in 11 public waterbodies, and over 55,000 acres.
- SC DNR and Greenwood County split the cost of treatments for hydrilla and najas.
- Depending on the type of chemical, environmental conditions, and response rate, multiple treatments may be required.
- Once hydrilla is introduced, it is almost impossible to completely remove all of it.

Integrated Aquatic Plant Management

- All management techniques have environmental, social, and physical impacts.
- Management should be site specific, such as recreational areas should have a higher priority than critical habitat areas.
- Techniques include Physical, Chemical, and Biological.
- Using more than just one type is most effective in many areas.



Physical Techniques

- Most common form is hand raking/ pulling aquatic nuisance weeds from the lake.
- Residents frequently ask for permission to remove noxious, invasive weeds from around their docks and piers. Many use hand pulling to rid themselves of the weeds.
- Physical techniques usually require more man-power than chemical and biological.

<u>Management Method</u>	<u>Advantages</u>	<u>Disadvantages</u>	<u>Areas</u>	<u>Plant response</u>
Hand Cutting/ Pulling	Low technology, affordable, selective	Labor intensive,	Volunteers	Effective in very localized areas.
Harvesting (Cut & Remove)	Removes plant biomass	Slower and more expensive, Sediment problems	Chronic plant areas	Cosmetic, non- selective, short- term
Dredging/ Sediment removal	Creates deeper water, Long-term results	Very expensive, Deal with dredge sediment	Shallow lakes	Not selective
Drawdown	Inexpensive, Moderate- term results	User and environmental impacts	Manmade lakes	Less effective on herbaceous perennials
Benthic Barriers	Direct and effective, Moderate-term results	Not aesthetically pleasing	Small areas	Not selective



Chemical Techniques

- Chemical treatment options have changed drastically over the last 20 years.
- There is only a limited number of herbicides that is available for use in water due to strict standards.
- Two groups of herbicides:
 - Contact – act immediately, but do not have a sustained effect.
 - Systemic – are translocated throughout plant, and are more effective at killing entire plant.

- **South Carolina Law requires individuals to possess a Pesticide Applicators License in Category 5, Aquatic Pest Control, before they apply aquatic herbicides on private or public property.**
 - **A license is also required, regardless of ownership, if the application is made to an area where public access to the treated site is expected.**
 - **Private swimming lakes, where the public would be exposed to the treated waters, are the most obvious example of the latter requirement.**
 - **On all public facilities, such as golf courses, driving ranges, subdivisions, condominium/apartment complexes and mobile home parks, applicators are required to possess a Category 5 License to apply aquatic pesticide.**
- **The Director of Lake Management and the Lake Specialist II are both certified in Cat 5.**



<u>Compound</u>	<u>Exposure Time</u>	<u>Advantages</u>	<u>Disadvantages</u>	<u>Areas</u>	<u>Plant Response</u>
Copper	Intermediate (18-72 hours)	Inexpensive, Rapid, Approved for drinking water (Nautique – No water restrictions)	Doesn't biodegrade, But is biologically inactive in sediments	Lakes for an algicide	Broad spectrum
Diquat	Short (12-36 hours)	Rapid, Limited drift	Doesn't affect underwater sections of plant	Shoreline, Localized areas	Broad spectrum
Endothall	Short (12-36 hours)	Rapid, Limited drift	Doesn't affect underwater sections of plant, (Aquathol K – Water Restrictions)	Shoreline, Localized areas	Broad spectrum
Fluridone	Very long (30-60 days)	Systemic, Very low dosage, Few label restrictions	Very long contact period, (Sonar – Water Restrictions)	Small lakes, Slow flow areas	Broad spectrum
Glyphosate	Not applicable	Widely used, Few label restrictions, Systemic	Very slow action, No submersed control	Nature preserves, Emergent plants only	Broad spectrum



Biological Techniques

- Biological techniques involve using other biological agents to combat aquatic weeds.
- Many biological techniques are still in the research and development phase.
- In combination with other types of techniques, some of these have been proven useful for lakes in SC.
- Greenwood County took a proactive step in 2009 with the release of Sterile Triploid Grass Carp

<u>Management Method</u>	<u>Advantages</u>	<u>Disadvantages</u>	<u>Areas</u>	<u>Plant response</u>
Grass Carp	Long-term control, Relatively inexpensive	Cannot control feeding sites, "All or None" response, Persistent	Areas with hydrilla and preferred species	Hydrilla preferred
Hydrilla Fly, Stem Weevil	Species selective	Has not been Established yet	Released in FL, AL, TX	(Research)
Native Weevil and Insects	Already established	Has not been Established yet	Released in VT, MN	(Research)
Fungal Pathogen	Acts as a contact bioherb, low dispersion, Broad spectrum	Expensive, cross-contamination	Research for watermilfoil and hydrilla	Plants fall apart, but regrow from roots

Grass Carp

- Grass Carp are a biological option that has been working effectively in other lakes such as Lake Murray, Lake Wylie, SC DNR lakes, Lake Marion, and other lakes across the country.
- Drawbacks:
 - Cost of carp
 - No immediate results, approximately 2 seasons
- Benefits:
 - Long-term control
 - No oxygen depletion like with herbicides



DEPARTMENT OF NATURAL RESOURCES
Aquatic Nuisance Species

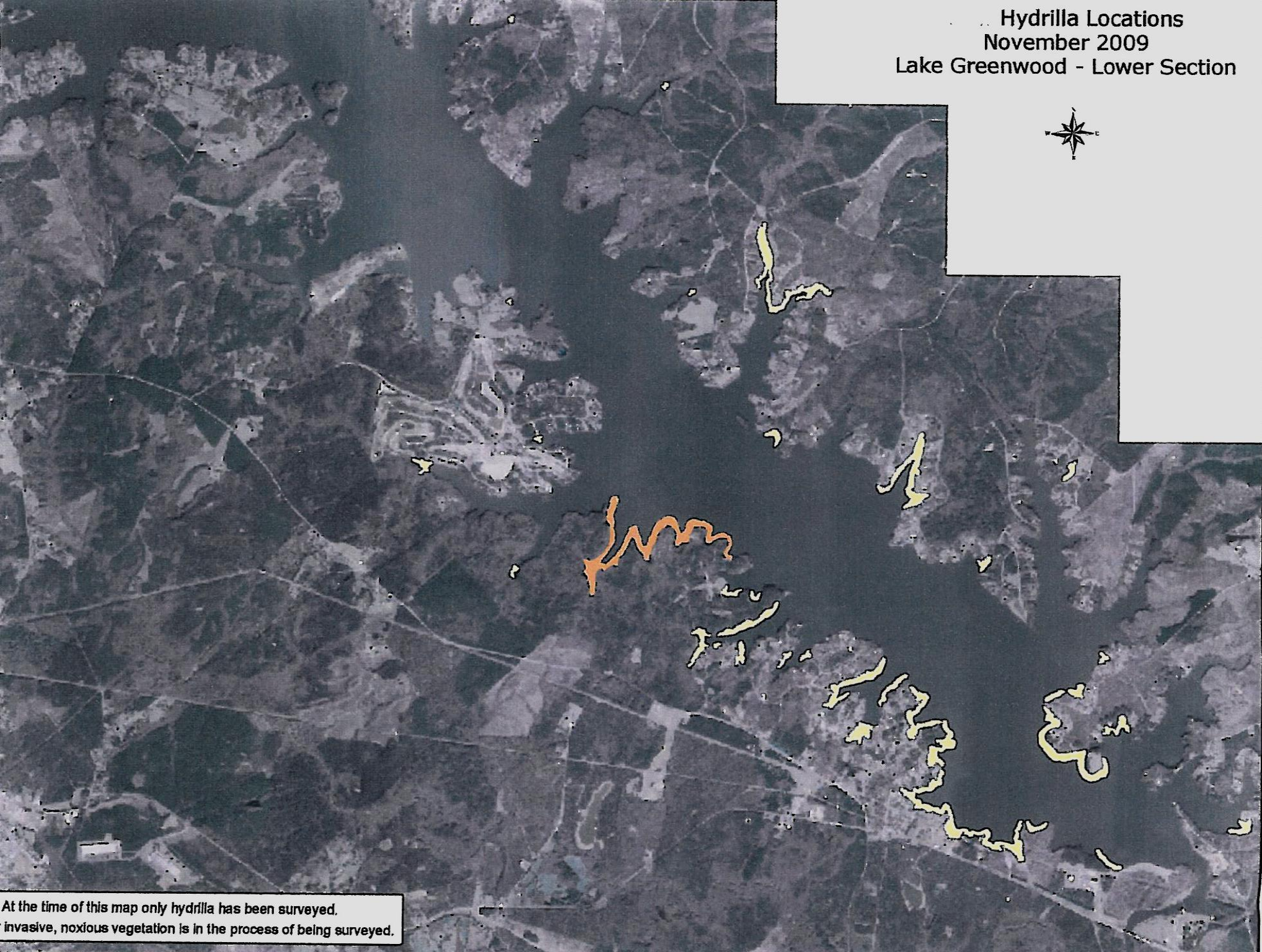
- Cost between \$6-11/ per fingerling.
- For Lake Greenwood, in 2009, 15 carp per hydrilla acre.
- Stocking rate research recommends between 9- 25 depending upon:
 - Acreage affected
 - Type of aquatic weeds
 - Habitat type
 - Purpose/ Use of the waterbody
 - Severity of infestation
 - Environmental factors

- Chemical treatment will be needed until Carp are able to feed effectively on the hydrilla and najas, and other exotics. (Carp will be able to feed effectively in 2-3 seasons.)
- Public opinion, however, does come into play when considering grass carp.
- Public opinions about carp vary. The majority of complaints center around the fact that carp will eat all vegetation, and it will destroy waterfowl and fish habitats.
- The majority of the positive comments center about the fact that carp will make the coves more accessible once the vegetation is destroyed.

Lake Greenwood and Invasive Aquatic Weeds

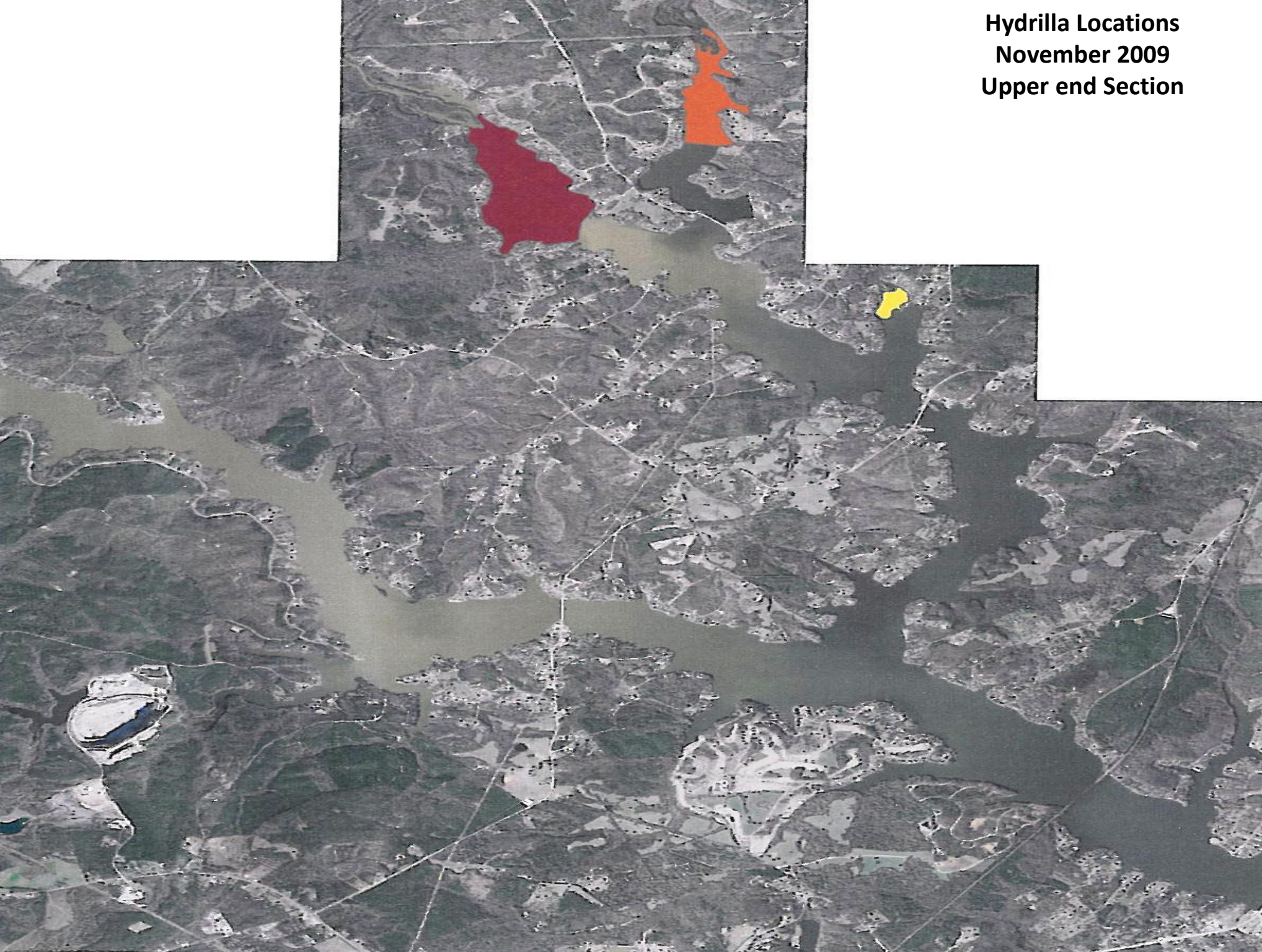
- SC DNR and Plant Management Council approved release of 3,000 carp into Lake Greenwood in 2009.
- In 2010, SC DNR added 3,000 additional carp for routine maintenance, environmental factors and morality rates of the carp.
- Chemical treatments will still be conducted as well. This year SC DNR has included Water primrose and Alligator weed into our treatment plan.
- Cost of chemical, amount of acreage, environmental factors, type of weed, and predominate shoreline type determine what areas are treated.

Hydrilla Locations
November 2009
Lake Greenwood - Lower Section



At the time of this map only hydrilla has been surveyed.
invasive, noxious vegetation is in the process of being surveyed.

**Hydrilla Locations
November 2009
Upper end Section**



What can Homeowners Do?

- **Prevention :**

- Don't put any nonnative plants, fish, pets or other organisms into any waterbody.
- Check boat trailers, boat hulls and propellers.
- Rinse and remove aquatic plants or invertebrate hitchhikers such as snails.
- Don't dump aquarium contents in lakes, channels or other water bodies.
- Replace invasive and other non-native plants in your yard with native species.
- You can cover the lake bottom with weed mats, w/ a permit.
- Do not put excessive fertilizers on your yard.
- Make sure all septic tanks are working properly.

Other noxious, invasive species

- The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 as amended by the National Invasive Species Act of 1996 listed guidelines for all vessels operating on U.S. waters, and deals with invasive, noxious species.
- Ballast waters and carelessness are the some of the main ways that invasive, noxious species enter new ecosystems.
- Invasive, noxious species compete with native species, disturb the balance, and affect the water quality and ecosystem.

Zebra and Quagga Mussel Sightings Distribution

Dreissena polymorpha and *D. rostriformis bugensis*

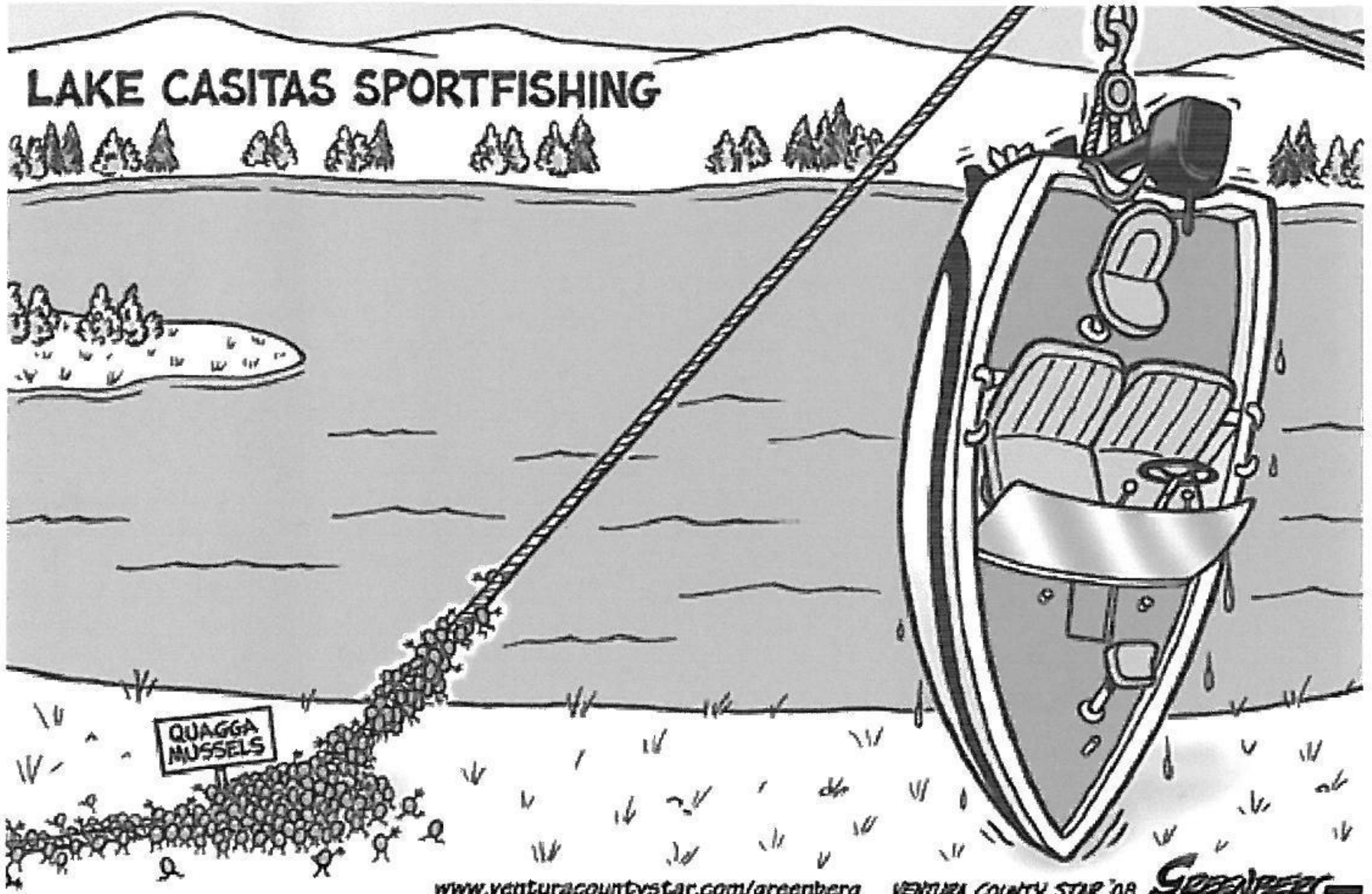


- Zebra mussel occurrences
- Quagga mussel occurrences
- Both species occurrences
- ★ Mussels trailed overland on boat hulls





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VENTURA COUNTY STAR '08

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